DEPARTMENT OF ELECTRICAL ENGINEERING
FACULTY OF ENGINEERING
UNIVERSITY OF ALEXANDRIA
EGYPT

EE363 Microwave and Optical Transmission Media
Part II: Optical Transmission Media

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I. Outline

- Introduction and Aim
- Physics of Light
  1. Electromagnetic waves
  2. Beams (Rays)
  3. A stream of photons
- Multimode Optical Fibers
  1. Step-index fiber
  2. Attenuation
  3. Modes in optical fibers
- Integrated Optical Waveguides
  1. Dielectric slap waveguide
  2. Wave representation in a slap waveguide
  3. Modes in a slap waveguide
  4. Mode pattern
  5. Mode chart
- Modal Distortion in Optical Fibers
  1. Modes in step-index fibers
  2. Intermodal (modal) distortion
  3. Graded-index fiber
  4. Modal-distortion rise-time
- Dispersion in Optical Fibers
  1. Material dispersion
  2. Waveguide dispersion
  3. Total pulse spreading
  4. Bit rate and bandwidth
- Single-Mode Fibers
  1. How a single-mode fiber works
  2. Wave representation in a single-mode fiber
  3. Dispersion and Bandwidth

II. Text Books and References

[1] J. Senior, *Optical Fiber Communications: Principles and Practice.* 3rd ed. New Jersey: Prentice Hall, 2009.

[2] G. Keiser, *Optical Fiber Communications.* 3rd ed. New York: McGraw-Hill, 2000.

[3] J. C. Palais, *Fiber Optic Communications.* 5th ed. Upper Saddle River, New Jersey: Prentice Hall, 2005.

III. Handouts and Assignments

- Handouts and assignments can be downloaded from:
  - ☞ http://teaching.alexeng.edu.eg/EE/hshalaby/

IV. Teaching and Assessments

- Teaching hours per week:
  1. Lectures: 4 hrs. Part I: 2 hrs, Part II: 2 hrs.
     - ☞ Group 1, Wednesday 8:30–10:00 AM, venue m2, every week.
     - ☞ Group 2, Wednesday 10:00–11:30 AM, venue m2, every week.
  2. Exercises: 1 hr.
  3. Laboratories: 1 hr.
- Exams and their durations:
  1. Midterm exam: 1.5 hrs.
  2. Final exam: 3 hrs.
- Distribution of a total mark of 150:
  1. Midterm exam: 30 marks.
  2. Lab. assessments: 20 marks.
  3. Oral exam: 10 marks.
  4. Final exam: 90 marks.